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Screening of *Capsicum annum* and its related species for drought tolerance

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Abstract

Chilli is an inevitable vegetable cum spice crop and its production is taken up both under rainfed and irrigated conditions. At present the local types available in a particular region are grown under rainfed conditions traditionally and they could able to withstand under drought to some extent but records lower yield. There is no exclusive variety / hybrid has been developed for drought tolerance to cultivate under rainfed condition. Therefore an effort was made to screen sixty-six cultivars of chilli belonging to *Capsicum annum*, *C. frutescens* and *C. baccatum* for drought tolerance by using polyethylene glycol (PEG). Important growth parameters like germination percentage, shoot length, root length, total length of seedling, vigour index and stress tolerance index were observed. The study revealed that, among the sixty-six genotypes evaluated, the genotypes viz., IC-119231, ST 13837 and EC 362917 were found to be highly tolerant to drought, since they recorded higher germination percentage (76.67, 80.00 and 73.33), total length of seedling (9.63, 3.13 and 6.83), vigour index (739.33, 250.00 and 501.33) and stress tolerance index (67.77, 66.40 and 65.34) respectively.

Keywords: Chilli, related species, Poly ethylene glycol, lab screening, germination percentage, length of seedling, vigour index, stress tolerance index

Introduction

Chilli (*Capsicum annum* L.), the green or the dried ripe pungent fruits of *Capsicum* species, is commercial crop of the Solanaceae family. In India chilli is cultivated in area of 3.66 lakh hectares with production of 37.37 lakh tonnes, (NHB, 2019) [8]. Chilli is mainly grown as a rainfed crop in certain pockets of Tamil Nadu viz., namely Virudhunagar, Ramnathapuram and Tirunelveli districts. Among the various production constraints, drought is considered as an economically important which leads to 85-100 per cent yield loss. Also there is no tolerant variety / hybrid has been identified for drought so far. Therefore, the present study was conducted to identify drought tolerant cultivars of chilli using Polyethylene glycol under laboratory condition so that the identified cultivars can be used to impart drought tolerance in high yielding cultivars through hybridization.

Materials and Methods**Experimental site**

The experiment was conducted at College Laboratory, Department of Vegetable Science, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore.

Experimental material

Sixty-six chilli genotypes collected from different national and international centres were screened for tolerance to drought using Poly ethylene glycol at standardized concentration. Since PEG induced osmotic stress is found to reduce cell water potential (Govindaraj *et al.*, 2010) [6] it is viewed as one of the reliable methods for screening desirable genotypes of chilli under moisture deficit condition (George *et al.*, 2013) [5]. The particulars of the genotypes used in the study are presented in the Table 1.

To standardize the optimum concentration of PEG 6000 for screening the collected chilly genotypes, the chilli variety Arka Lohit was chosen and the drought tolerance was imposed using PEG 6000 at the concentration of -0.5 to -5.0 bars. Based on the standardization study, -2.5 bars osmotic potential of PEG 6000 was chosen as optimum concentration (which recorded 50% germination) for screening all the 66 chilli genotypes. Ten seeds of each genotype were placed in petri-plates in three replications and moistened with distilled water for control and -2.5 bars PEG solution to screen the genotypes for drought. The following observations viz., Germination percentage (per cent), Shoot length of seedling (cm), Root length of seedling

(cm), Total length of seedling (cm), Vigour index and Stress Tolerance Index.

Table 1: Sources of chilli germplasm and their wild relatives used in the study

S.No	Source	Lines/Varieties	S.No	Source	Lines/Varieties	
<i>Capsicum annumL.</i>						
1	NBPGR, Amaravati	IC-119234	35	NBPGR, Hyderabad	IC-526856	
2		IC-119233	36		IC-526862	
3		IC-119230	37		IC-526858	
4		IC-119203	38		IC-565057	
5		IC-119231	39		IC-570388	
6		IC-119221	40		CA-175	
7		IC-119220	41		CA-183	
8		IC-045986	42		CA-4	
9	NBPGR, New Delhi	IC-018282	43	Guntur	CA-8	
10		IC-092115	44		CA-58	
11	AVRDC, Taiwan	EC-320525	45		CA-21	
12		EC-339047	46		CA-54	
13		EC-339037	47		CA-60	
14		AVPP9905	48		Gundur local 341	
15		VI047102	49		CA-117	
16		VI059328	50		LCA 620	
17	Hungary	EC-392684	51		LAM	LCA 639
18	China	EC-388995	52			Sadajampatti
19		EC-388996	53	Vellanikkara	CA 53	
20	NBPGR, Hyderabad	EC-321470	54	Paramakudi	CA-20	
21		EC-339047	55	Dharwad	CA-7	
22		EC-382176	56	Trichy	CA-101	
23		EC-399557	57	IIHR, Bangalore	ArkaLohit	
24		EC-399580	<i>Capsicum frutescensL.</i>			
25		EC-554803	58	NBPGR, Hyderabad	SNTV-87	
26		IC-119264	59		SNTV-88	
27		IC-119559	60		ST-13830	
28		IC-119611	61		ST-13837	
29		IC-119756	62		ST-13875	
30		IC-214947	63		AVRDC, Taiwan	AVPP9813
31	IC-505203	<i>Capsicum baccatumL.</i>				
32	IC-505242	64	USA	EC-362917		
33	IC-505262	65	Netherland	EC-121489		
34	IC-505476	66	NBPGR, Hyderabad	IC-315758		

Results and discussion

Screening of genotypes for osmotic stress tolerance using -2.5 bars PEG (6000)

The results showed significant differences among the genotypes for germination percentage (Table 2). The germination percentage of Arka Lohit ranged from 23.33 to 100. The optimum concentration of PEG was fixed as -2.5

bars as it resulted 53.33 per cent germination in the initial screening with various concentration of PEG in for the variety Arka Lohit. Sixty-six chilli genotypes were screened for drought stress tolerance by using optimized concentration -2.5 bars PEG (6000). Present study revealed that all the observed growth parameters showed highly significant variation between treatments as well as among the genotypes.

Table 2: Standardization of optimum concentration of Polyethylene glycol (PEG) for screening chilli genotypes

S. No	Treatments	Germination percentage
1	T ₁ - Control	100.00
2	T ₂ - -0.5 bar	93.33
3	T ₃ - -1.0 bar	86.66
4	T ₄ - -1.5 bar	83.33
5	T ₅ - -2.0 bar	66.66
6	T ₆ - -2.5 bar	53.33
7	T ₇ - -3.0 bar	36.66
8	T ₈ - -3.5 bar	23.33
9	T ₉ - -4.0 bar	0.00
10	T ₁₀ - -4.5 bar	0.00
11	T ₁₁ - -5.0 bar	0.00
Mean		49.39
SEd		3.76
CD (0.05)		7.79**
CD (0.01)		10.60**

*Significance level at $P < 0.05$ **Significance level at $P < 0.01$

Germination percentage (%)

The germination percentage of the selected genotypes ranged from 56.67 per cent to 100 per cent in control and a range of 0 per cent to 80.00 per cent was observed under stress condition with mean value of 82.27 per cent and 29.04 per cent respectively (Table 3). Even under stress condition, the genotypes ST-13875 (80.00 per cent) and IC-119231 (76.67

per cent) registered the highest germination percentage which confirmed the adaptive characters to drought stress during germination phase. Similar findings were also reported by Basha *et al.* (2015) [3] and Ananthi *et al.* (2019) [1]. The germination percentage reduction over control was high level in the genotypes ST-13837 (20.00 per cent) and IC-119231 (20.69 per cent).

Table 3: Effect of PEG 6000 (-2.5 bar) on germination percentage (%) in chilli genotypes

S.No	Genotypes	Control	Treatment	Germination percentage reduction over control
1	IC-119234	86.67	63.33	26.92
2	IC-119233	96.67	66.67	31.03
3	IC-119230	86.67	56.67	34.62
4	IC-119203	63.33	36.67	42.11
5	IC-119231	96.67	76.67	20.69
6	IC-119221	86.67	63.33	26.92
7	IC-119220	90.00	66.67	25.93
8	IC-045986	86.67	66.67	23.08
9	IC-018282	70.00	26.67	61.90
10	IC-092115	90.00	63.33	29.63
11	EC-320525	100.00	70.00	30.00
12	EC-339047	66.67	6.67	90.00
13	EC-339037	73.33	16.67	77.27
14	AVPP9905	100.00	56.67	43.33
15	VI047102	86.67	66.67	23.08
16	VI059328	96.67	56.67	41.38
17	EC-392684	60.00	0.00	100.00
18	EC-388995	63.33	13.33	78.95
19	EC-388996	96.67	66.67	31.03
20	EC-321470	56.67	10.00	82.35
21	EC-339047	66.67	0.00	100.00
22	EC-382176	80.00	6.67	91.67
23	EC-399557	66.67	3.33	95.00
24	EC-399580	83.33	23.33	72.00
25	EC-554803	86.67	66.67	23.08
26	IC-119264	73.33	3.33	95.45
27	IC-119559	83.33	0.00	100.00
28	IC-119611	96.67	6.67	93.10
29	IC-119756	83.33	10.00	88.00
30	IC-214947	96.67	63.33	34.48
31	IC-505203	83.33	6.67	92.00
32	IC-505242	66.67	0.00	100.00
33	IC-505262	90.00	16.67	81.48
34	IC-505476	70.00	10.00	85.71
35	IC-526856	60.00	0.00	100.00
36	IC-526862	70.00	16.67	76.19
37	IC-526858	70.00	0.00	100.00
38	IC-565057	66.67	13.33	80.00
39	IC-570388	76.67	16.67	78.26
40	CA-175	90.00	6.67	92.59
41	CA-183	83.33	13.33	84.00
42	CA-4	83.33	6.67	92.00
43	CA-8	73.33	16.67	77.27
44	CA-58	76.67	3.33	95.65
45	CA-21	73.33	13.33	81.82
46	CA-54	56.67	0.00	100.00
47	CA-60	83.33	10.00	88.00
48	Gundur local 341	100.00	13.33	86.67
S.No	Genotypes	Control	Treatment	Germination percentage reduction over control
49	CA-117	90.00	6.67	92.59
50	LCA 620	90.00	70.00	22.22
51	LCA 639	76.67	20.00	73.91
52	CA 106	70.00	13.33	80.95
53	CA 53	90.00	20.00	77.78
54	CA-20	90.00	6.67	92.59
55	CA-7	96.67	63.33	34.48
56	CA-101	66.67	0.00	100.00
57	ArkaLohit	100.00	53.33	46.67

58	SNTV-87	90.00	10.00	88.89
59	SNTV-88	93.33	63.33	32.14
60	ST-13830	73.33	6.67	90.91
61	ST-13837	100.00	80.00	20.00
62	ST-13875	90.00	56.67	37.04
63	AVPP9813	93.33	66.67	28.57
64	EC-362917	100.00	73.33	26.67
65	EC-121489	83.33	0.00	100.00
66	IC-315758	93.33	9.70	89.61
Mean		82.27	29.04	67.27
Genotype (G)		Treatment (T)	Interaction (G X T)	Genotype (G)
SEd	3.46	0.60	4.89	6.83
CD 5%	6.81**	1.19**	9.63**	13.51**
CD 1%	8.97**	1.56**	12.69**	17.86**

* Significance level at $P < 0.05$ **Significance level at $P < 0.01$

Shoot length of seedlings (cm)

The length of the shoots ranged from 0.50 cm to 4.90 cm in control and a range of 0 to 3.90 cm was observed under stress condition with a mean value 3.65 cm and 1.29 cm respectively (Table 4). Even under stress condition the genotypes Arka Lohit (3.90 cm) and IC-119231 (3.77 cm) registered the highest shoot length. The shoot length due to stress condition was reduced to greater level in the genotypes

IC-119234 (11.11 per cent) and EC-362917 (11.43 per cent). The reason behind reduced shoot length under stress condition is due to reduction of cell elongation by low water potential created by PEG, as cell elongation is mainly based on turgidity of the cell. Decreased growth rate with increasing osmotic stress was also reported by George *et al.*, 2013^[5]; Shamim *et al.*, 2014^[9] Waheed (2014)^[11] and Garg C *et al.*, (2019)^[4] in chilli.

Table 4: Effect of PEG 6000 (-2.5 bar) on Shoot length, Root length and Total length of seedlings (cm) in chilli genotypes

S. No	Genotypes	Shoot length of seedlings (cm)			Root length of seedlings (cm)			Total length of seedlings (cm)		
		Control	Treatment	Reduction over control	Control	Treatment	Reduction over control	Control	Treatment	Reduction over control
1	IC-119234	3.60	3.20	11.11	5.37	4.83	9.94	8.97	8.03	10.41
2	IC-119233	4.67	3.37	27.86	6.20	4.97	19.89	10.87	8.33	23.31
3	IC-119230	3.63	3.13	13.76	6.07	5.07	16.48	9.70	8.20	15.46
4	IC-119203	3.43	1.10	67.96	5.77	1.97	65.90	9.20	3.07	66.67
5	IC-119231	4.80	3.77	21.53	6.47	5.87	9.28	11.27	9.63	14.50
6	IC-119221	4.03	3.47	14.09	5.63	4.63	17.75	9.67	8.10	16.22
7	IC-119220	4.33	3.53	18.46	5.50	4.77	13.33	9.83	8.30	15.59
8	IC-045986	4.33	3.30	23.85	5.87	4.67	20.45	10.20	7.97	21.90
9	IC-018282	3.63	0.80	77.98	4.10	2.07	49.59	7.73	2.87	62.93
10	IC-092115	4.27	3.67	14.06	5.97	5.03	15.64	10.23	8.70	14.98
11	EC-320525	4.70	3.57	24.11	5.33	4.57	14.38	10.03	8.13	18.94
12	EC-339047	3.67	0.53	85.45	5.57	0.73	86.83	9.23	1.27	86.28
13	EC-339037	3.87	0.97	75.00	5.40	1.17	78.40	9.27	2.13	76.98
14	AVPP9905	3.93	3.10	21.19	5.80	4.47	22.99	9.73	7.57	22.26
15	VI047102	4.17	3.17	24.00	5.87	4.57	22.16	10.03	7.73	22.92
16	VI059328	4.40	3.40	22.73	5.67	4.77	15.88	10.07	8.17	18.87
17	EC-392684	3.77	0.00	100.00	5.47	0.00	100.00	9.23	0.00	100.00
18	EC-388995	3.70	0.77	79.28	5.40	1.27	76.54	9.10	2.03	77.66
19	EC-388996	4.57	3.40	25.55	5.77	4.57	20.81	10.33	7.97	22.90
20	EC-321470	3.20	0.27	91.67	4.90	0.87	82.31	8.10	1.13	86.01
21	EC-339047	3.93	0.00	100.00	4.17	0.00	100.00	8.10	0.00	100.00
22	EC-382176	4.03	0.27	93.42	3.47	0.77	77.88	7.50	1.03	86.24
23	EC-399557	3.77	0.00	100.00	4.77	0.00	100.00	8.53	0.00	100.00
24	EC-399580	3.57	0.77	78.50	4.70	0.97	79.43	8.27	1.73	79.03
25	EC-554803	4.30	3.37	21.71	5.77	4.97	13.87	10.07	8.33	17.22
26	IC-119264	3.47	0.07	98.08	4.87	0.53	89.04	8.33	0.60	92.80
27	IC-119559	3.70	0.00	100.00	4.97	0.00	100.00	8.67	0.00	100.00
S. No	Genotypes	Shoot length of seedlings (cm)			Root length of seedlings (cm)			Total length of seedlings (cm)		
		Control	Treatment	Reduction over control	Control	Treatment	Reduction over control	Control	Treatment	Reduction over control
28	IC-119611	3.83	0.37	90.43	5.17	0.63	87.74	9.00	1.00	88.89
29	IC-119756	3.77	0.13	96.46	5.07	0.27	94.74	8.83	0.40	95.47
30	IC-214947	4.23	3.40	19.69	5.67	5.17	8.82	9.90	8.57	13.47
31	IC-505203	3.40	0.27	92.16	4.40	0.67	84.85	7.80	0.93	88.03
32	IC-505242	3.67	0.00	100.00	4.67	0.00	100.00	8.33	0.00	100.00
33	IC-505262	4.10	0.67	83.74	4.87	1.07	78.08	8.97	1.73	80.67
34	IC-505476	3.77	0.47	87.61	5.10	0.97	81.05	8.87	1.43	83.83
35	IC-526856	3.50	0.00	100.00	5.27	0.00	100.00	8.77	0.00	100.00
36	IC-526862	3.60	0.30	91.67	4.57	0.57	87.59	8.17	0.87	89.39

37	IC-526858	3.87	0.00	100.00	4.77	0.00	100.00	8.63	0.00	100.00
38	IC-565057	4.13	0.93	77.42	4.63	1.17	74.82	8.77	2.10	76.05
39	IC-570388	3.80	1.27	66.67	4.50	1.47	67.40	8.30	2.73	67.06
40	CA-175	3.57	0.47	86.92	4.57	0.80	82.48	8.13	1.27	84.43
41	CA-183	3.63	0.47	87.16	4.83	1.37	71.72	8.47	1.83	78.35
42	CA-4	3.50	0.40	88.57	5.07	0.67	86.84	8.57	1.07	87.55
43	CA-8	3.87	0.40	89.66	4.47	1.07	76.12	8.33	1.47	82.40
44	CA-58	4.27	0.13	96.88	4.37	0.33	92.37	8.63	0.47	94.59
45	CA-21	4.03	0.57	85.95	4.17	1.03	75.20	8.20	1.60	80.49
46	CA-54	4.00	0.00	100.00	5.07	0.00	100.00	9.07	0.00	100.00
47	CA-60	3.60	0.27	92.59	4.87	0.77	84.25	8.47	1.03	87.80
48	Gundur local 341	3.73	0.17	95.54	4.47	0.67	85.07	8.20	0.83	89.84
49	CA-117	3.47	0.27	92.31	4.67	0.67	85.71	8.13	0.93	88.52
50	LCA 620	4.37	3.50	19.85	5.73	4.60	19.77	10.10	8.10	19.80
51	LCA 639	4.17	1.17	72.00	4.80	1.57	67.36	8.97	2.73	69.52
52	CA 106	4.43	0.27	93.98	4.53	0.77	83.09	8.97	1.03	88.48
53	CA 53	3.73	0.97	74.11	4.27	1.67	60.94	8.00	2.63	67.08
54	CA-20	3.87	0.20	94.83	4.97	0.40	91.95	8.83	0.60	93.21
55	CA-7	4.57	3.20	29.93	6.00	4.60	23.33	10.57	7.80	26.18
S. No	Genotypes	Shoot length of seedlings (cm)			Root length of seedlings (cm)			Total length of seedlings (cm)		
		Control	Treatment	Reduction over control	Control	Treatment	Reduction over control	Control	Treatment	Reduction over control
56	CA-101	3.57	0.43	87.85	4.80	1.47	69.44	8.37	1.90	77.29
57	ArkaLohit	4.90	3.90	20.41	6.17	5.10	17.30	11.07	9.00	18.67
58	SNTV-87	0.80	0.13	83.33	1.03	0.37	64.52	1.83	0.50	72.73
59	SNTV-88	1.23	0.97	21.62	1.97	1.37	30.51	3.20	2.33	27.08
60	ST-13830	0.50	0.07	86.67	1.03	0.13	87.10	1.53	0.20	86.96
61	ST-13837	1.40	1.17	16.67	2.37	1.97	16.90	3.77	3.13	16.81
62	ST-13875	1.10	0.87	21.21	2.07	1.67	19.35	3.17	2.53	20.00
63	AVPP9813	1.50	0.97	35.56	2.27	1.87	17.65	3.77	2.83	24.78
64	EC-362917	3.50	3.10	11.43	4.17	3.73	10.40	7.67	6.83	10.87
65	EC-121489	3.23	0.00	100.00	4.70	0.00	100.00	7.93	0.00	100.00
66	IC-315758	3.10	0.20	93.55	4.57	0.40	91.24	7.67	0.60	92.17
	Mean	3.65	1.29	65.39	4.78	1.96	60.52	8.43	3.24	62.71

	Shoot length of seedlings (cm)				Root length of seedlings (cm)				Total length of seedlings (cm)			
	Genotype (G)	Treatment (T)	Interaction (G X T)	Genotype (G)	Genotype (G)	Treatment (T)	Interaction (G X T)	Genotype (G)	Genotype (G)	Treatment (T)	Interaction (G X T)	Genotype (G)
SE d	0.12	0.02	0.17	4.89	0.18	0.03	0.25	6.02	0.28	0.05	0.40	5.00
CD5%	0.24	0.04	0.34	9.67	0.35	0.06	0.49	11.91	0.56	0.10	0.79	9.90
CD1%	0.32	0.05	0.45	12.78	0.46	0.08	0.65	15.73	0.74	0.13	1.04	13.09

*Significance level at $P < 0.05$ **Significance level at $P < 0.01$

Root length of seedlings (cm)

The root length of the genotypes ranged from 1.03 cm to 6.47 cm in control. It was ranged from 0 to 5.87 cm was observed under stress condition with a mean value of 4.78 cm in control and 1.96 cm under stress respectively (Table 4). Under stress condition the genotypes IC-119231 (5.87 cm) and IC-214947 (5.17 cm) registered the highest root length. The reduction in root length due to stress condition over control was less in the genotypes IC-214947 (8.82 per cent) and IC-119231 (9.28 per cent). Basha *et al.* (2015) [3] and Shamim *et al.* (2016) [9] depicted that good seed germination and vigour may lead to deep and good root system permitting the seeds or seedlings to extract moisture in the medium. Thus, early and rapid elongation of roots is a key trait of drought tolerance.

Total length of seedlings (cm)

The total length of seedlings ranged from 1.53 cm to 11.27 cm under control while it ranged from 0 to 9.63 cm under stress condition with a mean of 8.43 cm and 3.24 cm respectively in control and PEG treatment (Table 4). Even under stress condition the total length of the seedling was the highest in the genotypes IC-119231 (9.63 cm) followed by Arka Lohit (9.00 cm). The reduction in root length under

stress condition was lower over the control in the genotypes IC-119234 (10.41 per cent), EC-362917 (10.87 per cent) and IC-214947 (13.47 per cent).

Vigour index

The vigour index ranged from 111.67 to 1106.00 in control and a range of 0 to 739.33 was observed under stress condition with a mean value of 694.24 and 175.27 respectively. The PEG treated genotype IC-119231 registered the highest vigour index (739.33) followed by LCA 620 (567.00) and EC-320525 (566.67). The genotypes EC-121489, CA-101, CA-54, IC-526858, IC-526856, IC-505242, IC-119559, EC-399557, EC-339047, EC-392684 registered zero vigour index.

Stress Tolerance Index

Stress Tolerance Index (STI) is a more stable character and can be considered as a useful tool to screen drought tolerant genotypes. The stress tolerance index ranged from 0 to 67.77 among the genotypes with a mean value of 21.76 (Table 5) (Fig 1). The genotype IC-119231 recorded the highest stress tolerance index of 67.77 followed by ST 13837 (66.40) and EC 362917 (65.34) while the lowest stress tolerance index was recorded in the genotypes *viz.*, EC-121489, CA-101, CA-

54, IC-526858, IC-526856, IC-505242, IC-119559, EC-399557, EC-339047, EC-392684. The high stress tolerance index of genotypes might be due to higher germination percentage with elevated root and shoot length leading to

superior vigour index which was reported by Kulkarni and Deshpande (2007)^[7], Sivakumar (2013)^[10] and Bacallao *et al.* (2016)^[2]

Table 5: Effect of PEG 6000 (-2.5 bar) on vigour index, stress tolerance index in chilligenotypes

S.No	Genotypes	Vigour index		Stress tolerance index
		Control	Treatment	
1	IC-119234	778.00	509.00	65.47
2	IC-119233	1051.67	557.00	52.83
3	IC-119230	843.00	466.00	55.20
4	IC-119203	583.00	113.33	19.30
5	IC-119231	1089.99	739.33	67.77
6	IC-119221	838.67	512.22	61.69
7	IC-119220	885.00	555.00	62.55
8	IC-045986	886.33	529.33	60.32
9	IC-018282	541.67	75.00	14.09
10	IC-092115	921.00	550.67	59.80
11	EC-320525	1003.33	566.67	56.78
12	EC-339047	617.00	12.67	1.92
13	EC-339037	679.00	36.33	5.45
14	AVPP9905	973.33	430.00	44.03
15	VI047102	871.00	516.67	59.24
16	VI059328	976.32	460.33	47.79
17	EC-392684	554.67	0.00	0.00
18	EC-388995	573.00	27.67	4.77
19	EC-388996	1000.00	532.01	53.11
20	EC-321470	459.99	17.00	3.42
21	EC-339047	539.00	0.00	0.00
22	EC-382176	600.00	10.32	1.71
23	EC-399557	570.00	0.00	0.00
24	EC-399580	687.33	40.67	5.91
25	EC-554803	875.00	551.33	64.39
26	IC-119264	608.33	3.33	0.57
27	IC-119559	725.00	0.00	0.00
28	IC-119611	871.00	10.00	1.18
29	IC-119756	734.00	6.00	0.81
30	IC-214947	957.00	542.67	57.11
31	IC-505203	651.00	9.33	1.36
32	IC-505242	556.00	0.00	0.00
33	IC-505262	807.00	29.33	3.63
34	IC-505476	620.67	15.00	2.39
35	IC-526856	526.00	0.00	0.00
36	IC-526862	571.67	13.98	2.48
37	IC-526858	604.33	0.00	0.00
38	IC-565057	585.33	27.67	4.92
39	IC-570388	638.55	46.67	7.09
40	CA-175	732.00	12.67	1.64
41	CA-183	702.33	25.00	3.50
42	CA-4	714.53	10.67	1.45
43	CA-8	610.00	23.33	3.77
44	CA-58	661.00	4.67	0.67
45	CA-21	601.67	32.00	5.61
46	CA-54	515.00	0.00	0.00
47	CA-60	704.33	10.33	1.47
48	Gundur local 341	820.00	10.67	1.32
49	CA-117	736.67	9.33	1.16
50	LCA 620	915.00	567.00	62.88
51	LCA 639	688.33	55.33	7.82
52	CA 106	627.67	13.33	2.15
53	CA 53	719.00	52.67	7.35
54	CA-20	795.00	6.00	0.74
55	CA-7	1023.33	494.00	48.39
56	CA-101	559.99	0.00	0.00
57	ArkaLohit	1106.67	480.00	43.36
58	SNTV-87	165.00	7.33	4.80
59	SNTV-88	298.67	148.67	50.35
60	ST-13830	111.67	1.99	1.72

61	ST-13837	376.67	250.00	66.40
62	ST-13875	285.00	143.33	50.43
63	AVPP9813	351.33	189.33	53.78
64	EC-362917	766.67	501.33	65.34
65	EC-121489	662.33	0.00	0.00
66	IC-315758	716.67	6.00	0.80
Mean		694.24	175.27	21.76
	Genotype (G)	Treatment (T)	Interaction (G X T)	Genotype (G)
SEd	32.14	5.59	45.45	3.60
CD 5%	63.29**	11.01**	89.50**	7.12**
CD 1%	83.39**	14.51**	117.93**	9.41**

* Significance level at $P < 0.05$ **Significance level at $P < 0.01$

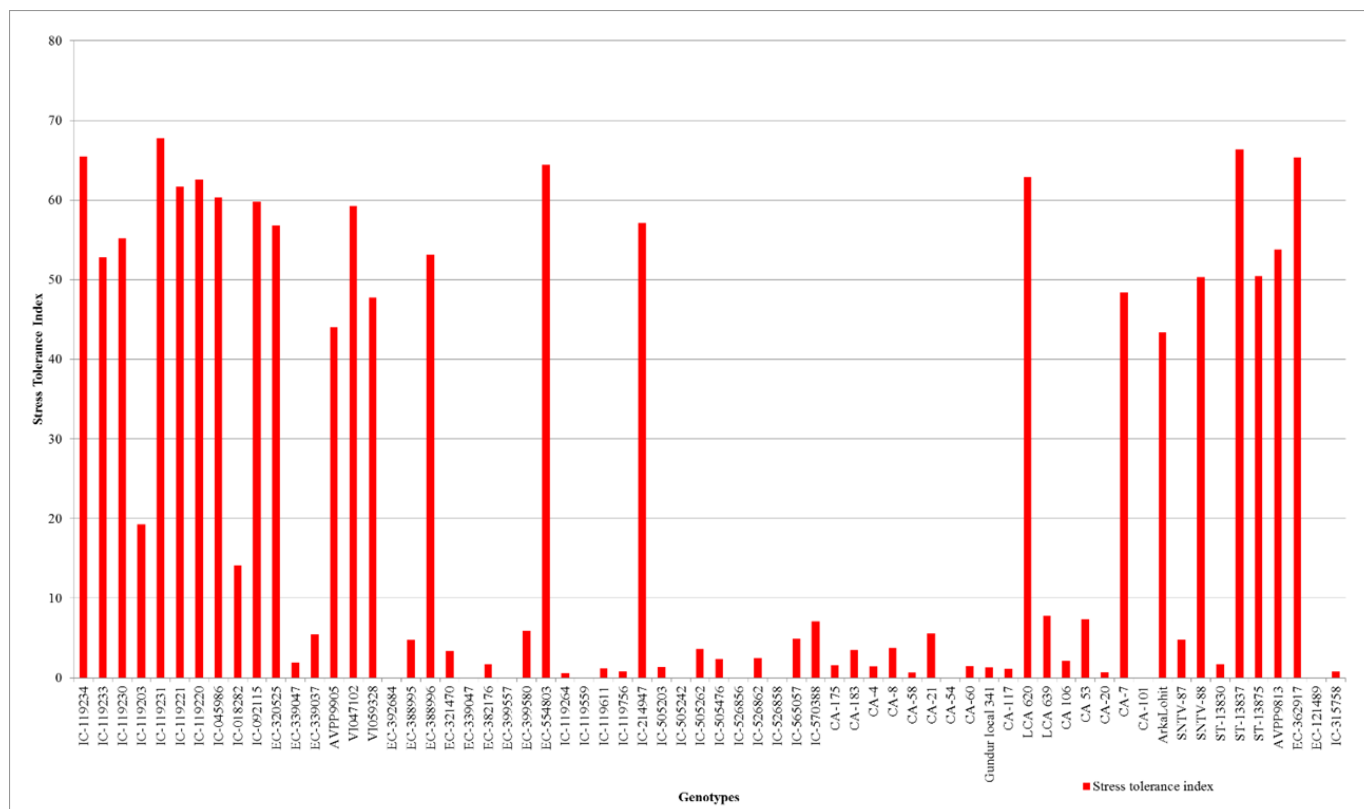


Fig. 1: Effect of PEG 6000 on Stress Tolerance Index of chilli genotypes

Conclusion

The results of the present study revealed that drought affects some of the physiological process in chilli germination and seedling growth. The increase in drought level decreased the germination and growth characters. The *Capsicum annum* genotypes viz., IC-119231, Arka Lohit, LCA 620, EC-320525, IC-119234, IC 214947, *Capsicum frutescens* genotype ST 13837 and *Capsicum baccatum* genotype EC 362917 were identified as highly drought tolerant genotypes among the evaluated 66 genotypes. The drought tolerant chilli genotypes identified from the present work were further evaluated for their field appraisal for further screening. Such a drought tolerant genotypes can also be used in breeding programs for developing superior and drought tolerant hybrids and also for cultivation in the field under drought prone area.

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